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Resener

[11] 4,215,250

[45] Jul. 29, 1980

[54] **MICROPHONE SUPPORT WITH SIMULTANEOUS ADJUSTMENT OF PLURAL DEGREES OF FREEDOM**

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[73] Assignee: **Western Electric Company, Inc.**, New York, N.Y.

[21] Appl. No.: **952,277**

[22] Filed: **Oct. 18, 1978**

[51] **Int. Cl.**[2] **H04R 1/00**

[52] **U.S. Cl.** **179/149**; 179/150; 179/152; 179/155

[58] **Field of Search** ..... 179/146 R, 147, 148 F, 179/149, 150, 151, 152, 153, 154, 155, 156 A; 52/108, 309.16; 248/122, 160, 274

[56] **References Cited**

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3,925,943	12/1975	Petrie	52/108

Primary Examiner—James W. Moffitt

Attorney, Agent, or Firm—Charles S. Phelan

[57] **ABSTRACT**

A microphone (**11**) is secured to one end of a unidirectionally flexible tape (**12**) which is removably storable in a housing (**10**) after passage through a tracking mechanism (**13**). That mechanism is part of a further mechanism (**26, 37, 41**) for holding an exiting portion of the tape in the angular orientation assumed by the tape at the end of a removal operation.

9 Claims, 17 Drawing Figures

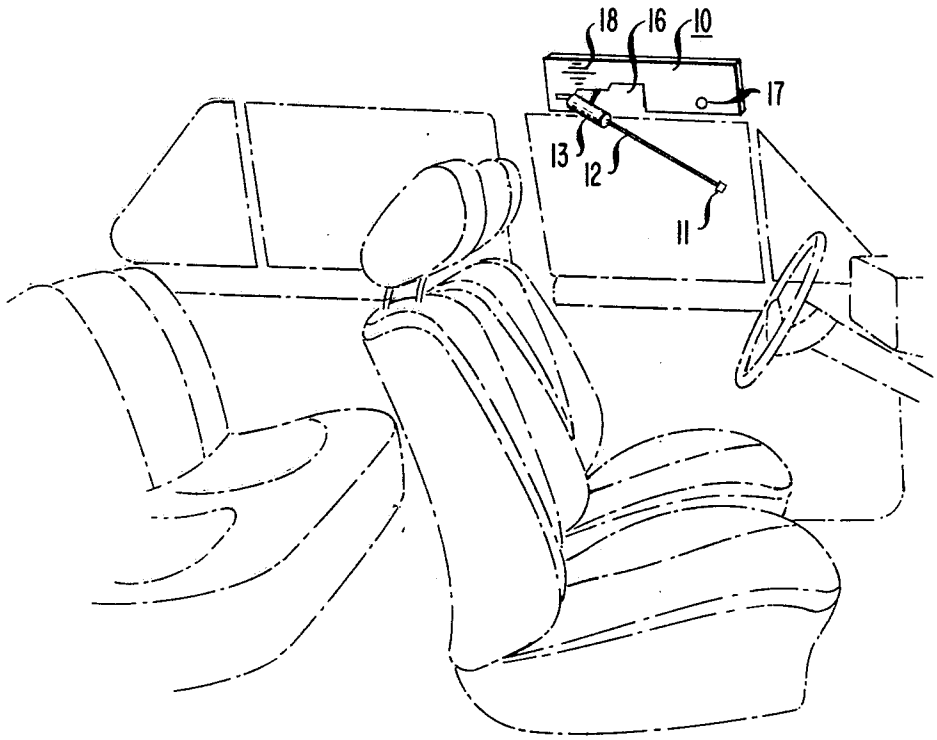


FIG. 1

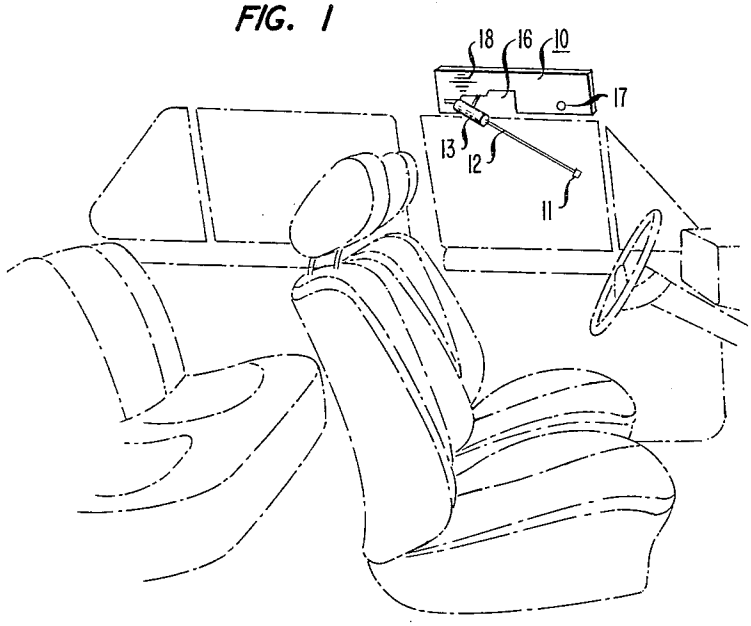
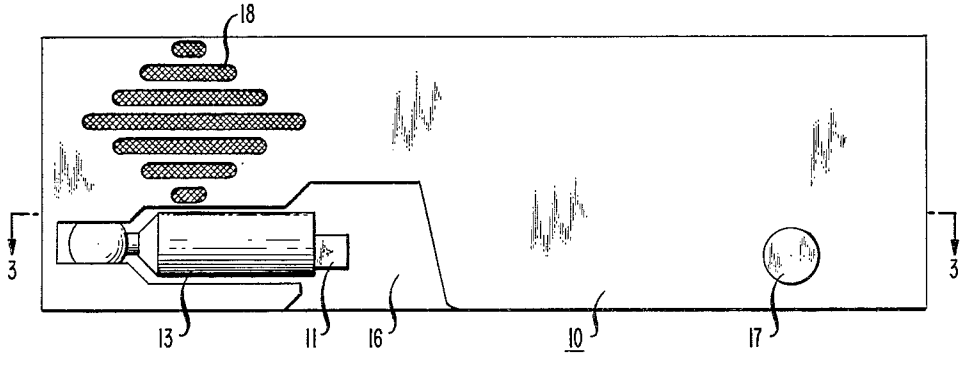


FIG. 2



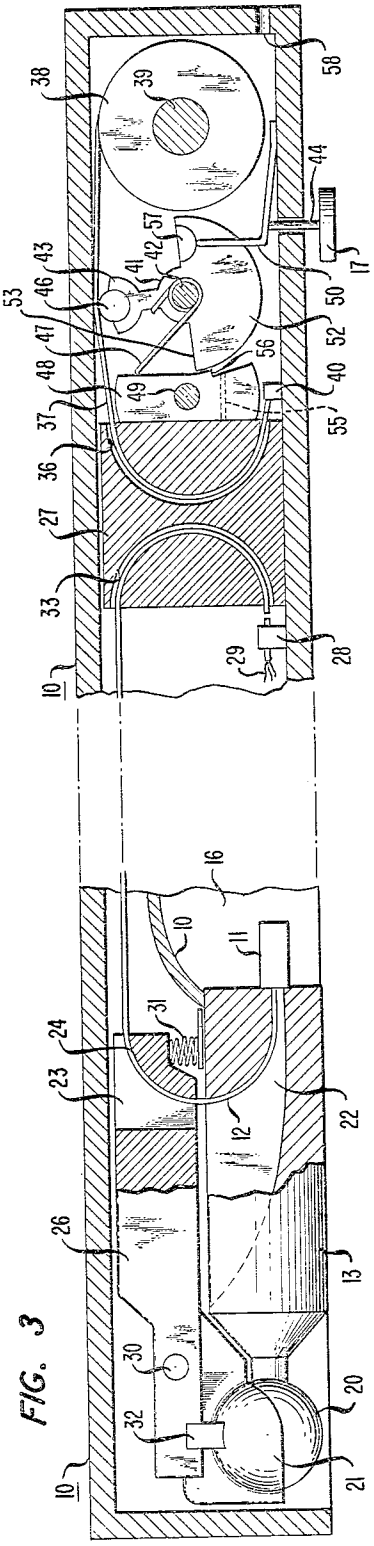


FIG. 3

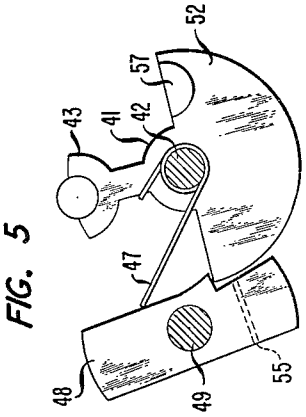


FIG. 5

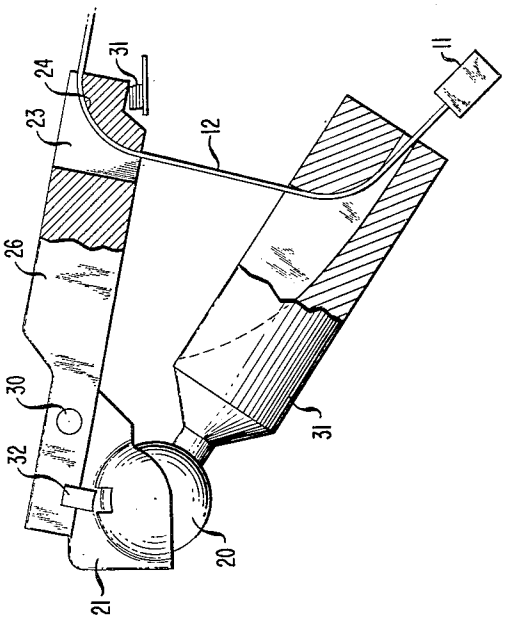


FIG. 4

FIG. 6

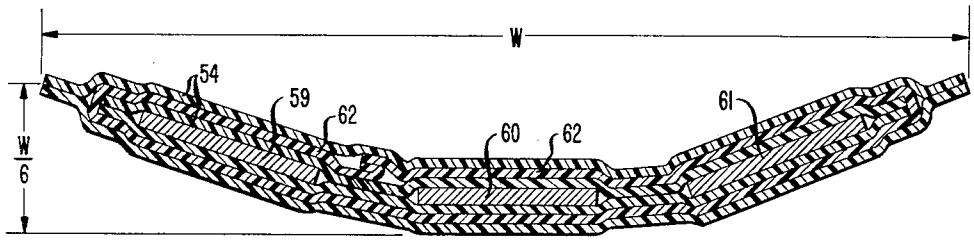


FIG. 7

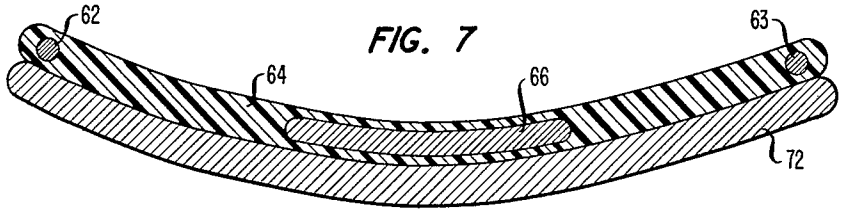


FIG. 8

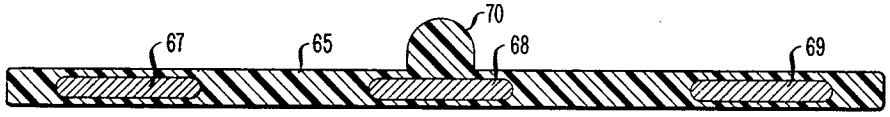
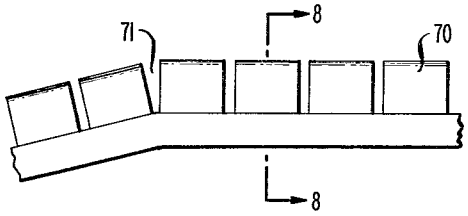


FIG. 9



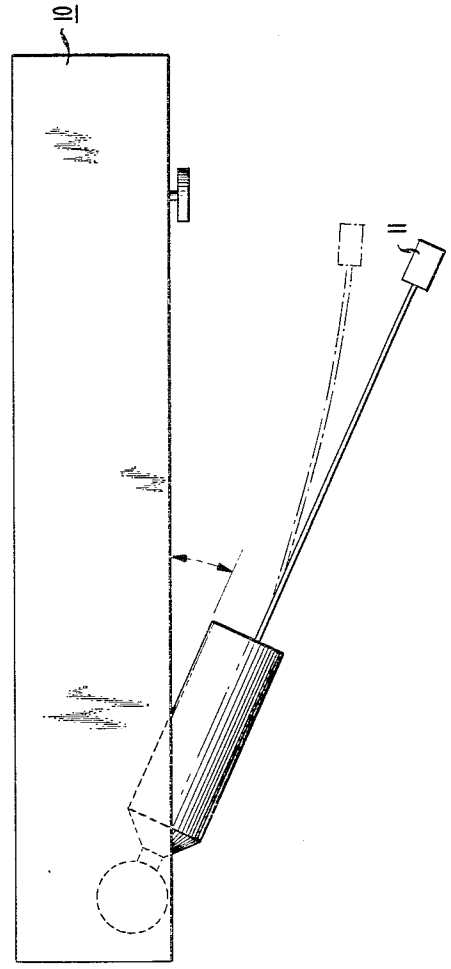
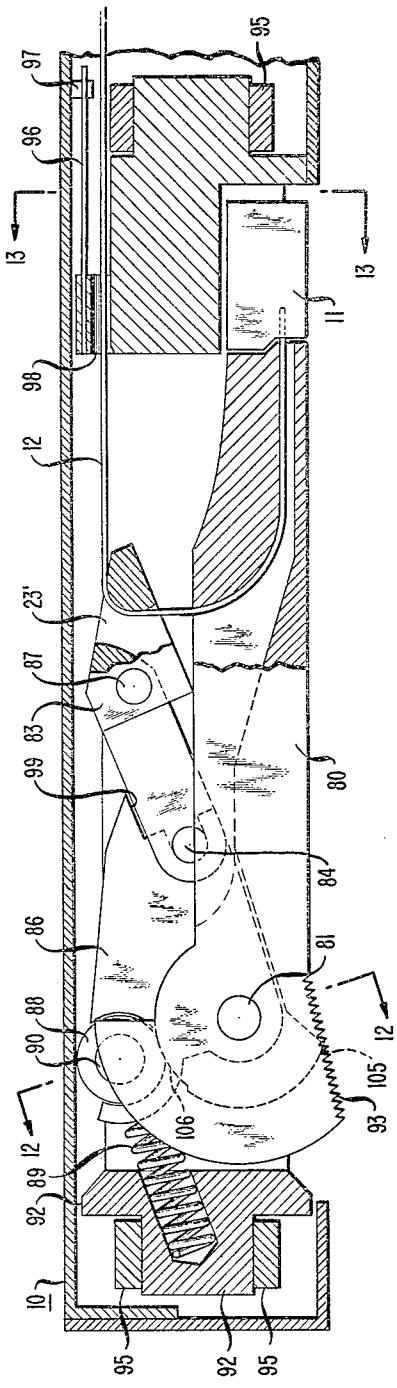

10
11

FIG. 10


95
97
96
13
13
11
98
12
23'
87
83
99
80
84
86
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88
90
12
105
93
106
12
89
92
10
95
92
95

FIG. 11

FIG. 12

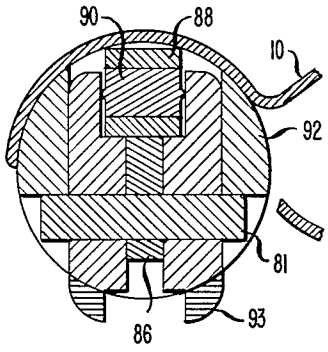


FIG. 13

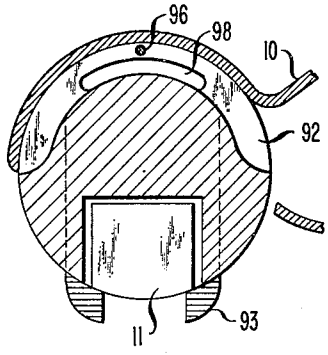


FIG. 14

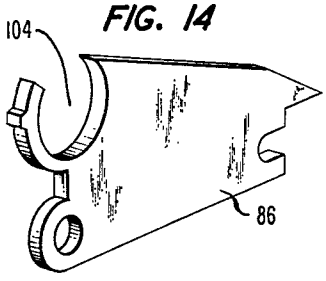


FIG. 15

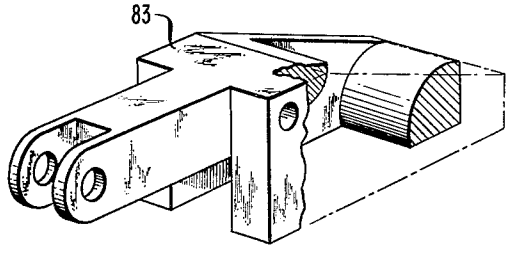


FIG. 16

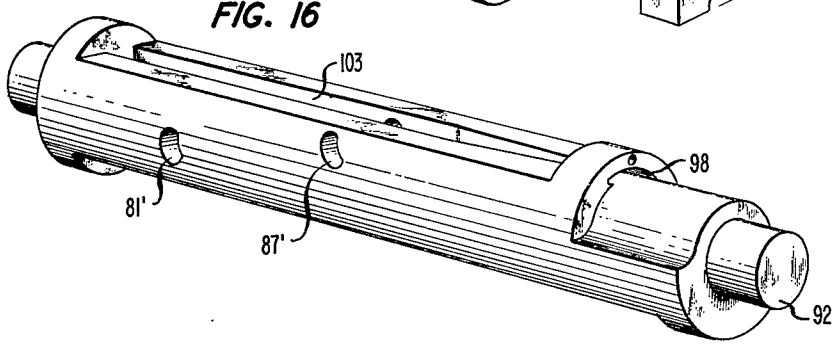
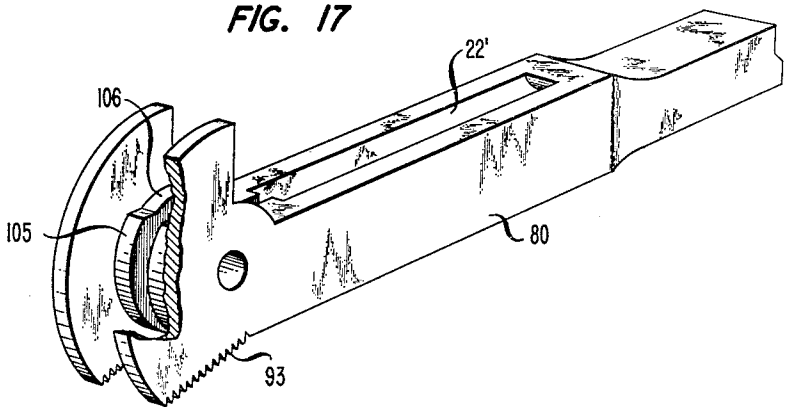


FIG. 17



MICROPHONE SUPPORT WITH SIMULTANEOUS ADJUSTMENT OF PLURAL DEGREES OF FREEDOM

TECHNICAL FIELD

This invention relates to a microphone support, and it relates more particularly to such a support for use in mobile radiotelephone applications.

BACKGROUND OF THE INVENTION

In mobile radiotelephone applications, it is, at times, desirable to have facilities for hands-free operation so that the driver of the vehicle need not hold a microphone or other handset while driving. It is assumed without limitation that the driver is the principal radiotelephone user. It has been found that many mobile unit users dislike microphones which are attached to their person or to their clothing in the manner often observed in the entertainment industry. In a more technical sense, it is further desirable that any microphone be located relatively close to a user's mouth in such a way as to be readily deflectable in the event of a change in position of the body of the user. Furthermore, the microphone should be so locatable with a minimum of distraction to the user.

There are a wide variety of adjustable support arrangements for subscriber telephone apparatus including microphones. One example is found in the A. Hufschmid U.S. Pat. No. 2,048,865 in which a handset articulated support of plural links is flexible in only one direction because the links are secured together by off-center transverse pins. In such an arrangement, there is basically one fixed radius of extended position, and adjustable set screws are provided to fix the height and angle of the extended support. An electric cord for the handset extends through the links and through an unpivoted end of a rotatable support for the multilink flexible support. It is at once apparent that substantial user attention is required in order to make the various adjustments for correctly positioning the multilink support member.

SUMMARY OF THE INVENTION

The problems of prior adjustable support arrangements for a microphone are alleviated in accordance with the present invention which employs as a microphone support an unarticulated member that is configured to allow flexure in substantially only one direction.

BRIEF DESCRIPTION OF THE DRAWING

A more complete understanding of the invention and its various features, objects, and advantages may be obtained from a consideration of the following detailed description and the appended claims in connection with the attached drawings in which:

FIG. **1** is a perspective view of one application of the present invention;

FIG. **2** is a front elevation view of a microphone housing in accordance with the present invention;

FIG. **3** is a sectional view of the embodiment of FIG. **2** taken along lines 3,3 in FIG. 2;

FIG. **4** is an enlarged view of a swivel arrangement employed in FIG. 3;

FIG. **5** is an enlarged view of a spring brake arrangement employed in the embodiment of FIG. 3;

FIGS. **6** through **8** are cross-sectional views of different embodiments of a flexible support tape employed in the embodiment of FIG. 3;

FIG. **9** is a side edge view of the tape of FIG. 8;

FIG. **10** is a top view of the embodiment of FIG. **1** with the microphone extended;

FIG. **11** is a sectional view, as in FIG. **3**, of a modified tape tracking mechanism;

FIGS. **12** and **13** are different cross-sectional views of the embodiment of FIG. **11**; and

FIGS. **14–17** are perspective views of certain parts of the embodiment of FIG. **11**.

DETAILED DESCRIPTION

FIG. **1** shows a perspective view of a hands-free microphone housing **10** utilizing the present invention. The housing is illustratively mounted in an automobile (partially indicated by broken lines) above the door next to the driver or other occupant most likely to use radiotelephone equipment with which the microphone is associated. A microphone **11** is secured to a free end of an elongated flexible member such as an unarticulated tape **12** which is configured (as will be described) to be flexible in one direction which is transverse to the longitudinal axis of the tape. That direction is, in terms of FIG. 1, substantially parallel to the housing **10** when the tape **12** is extended substantially perpendicularly to the housing.

When microphone **11** is removed to a usage position, tape **12** exits from the housing **10** through a stub boom **13** which is part of a tape orientation tracking and holding mechanism (to be described). That mechanism tracks the tape angular position with respect to the housing and, upon termination of a removal operation, holds an exiting portion of the tape adjacent to the boom in its position at that time as to both the extent of removal from the housing and the tape orientation as removed. When the tracking and holding mechanism is actuated to release the tape, a retracting mechanism in the housing **10** restores the tape in the housing and restores the boom **13** to a home position in a housing recess **16** for the boom and microphone **11**. Housing **10** also advantageously includes a volume control knob **17** for adjusting the volume in a loudspeaker circuit connected to the remainder of the radiotelephone apparatus (not shown) by rotating the knob. In addition, however, the knob is also advantageously arranged, in a manner now well known in the art, to be pushed in or pulled out along its rotational axis for controlling another function. In this case the other function is the release of the aforementioned tape retracting apparatus. Housing **10** further includes a loudspeaker, as schematically indicated by the louvers **18** and in the housing **10**, as well as electronics normally associated with the hands-free type of microphone and speaker combination, now well known in the art and not comprising a part of the present invention.

FIG. **2** shows a front elevation view of the housing **10** with the microphone **11** and boom **13** in their home positions in the recess **16**.

FIG. **3** presents a cross-sectional view of the contents of the housing **10** taken at lines 3,3 in FIG. **2**. This cross-sectional view depicts the aforementioned tracking, holding, retracting, and releasing mechanisms. The housing **10** is, for example, a relatively rigid, formed metallic material which provides electromagnetic shielding between the microphone tape cable **12** and

any other electric circuits which may be situated in the upper portion of the housing **10** in FIG. **2**.

The stub boom **13** includes a ball **20** on one end thereof which is held in a socket **21** to form a swivel coupling between the boom **13** and the housing **10**. The boom **13** includes a curving funnel shaped aperture **22** extending between the upper surface and the right-hand end surface of the boom as illustrated in FIG. **3**. The large portion of the aperture **22** is in the upper (as shown in FIG. **3**) face of the boom **13**. Tape **12** passes through the aperture **22** and into an aperture **23** in a brake arm **26** on the way to a retraction coupling slider block **27** and a mechanical anchor point illustrated in the form of a clamp **28** which secures an end portion of the tape **12** to a nearby wall of the housing **10**. A central portion of the FIG. **3** structure is broken out for convenience of illustration but is of sufficient length to allow tape extension a desired maximum distance from housing **10**. Terminals for making electrical connections to conductors in the tape **12** are advantageously at connectable **29** the loose ends of these conductors. As will be subsequently further described, the tape **12** is advantageously a flexible tape having a predetermined transverse curvature when the tape is not subjected to external forces. Thus, in FIG. **3**, the longitudinal edge view of the tape **12** shows simply the tape material thickness in locations where the tape is being held against another member. However, although not specifically shown in FIG. **1** portion of the aperture **22** where the tape is relieved of forces holding it against walls of passageways, it resumes its natural unrestrained curvature.

The brake arm **26** pivots about an axle **30** and is urged by a coil spring **31** in a counterclockwise direction about the axle **30** to force a brake pad **32** through a hidden slot in the socket **21** to come into frictional engagement with the ball **20**. This frictional engagement under the action of spring **31** has a sufficient force normally to hold the boom **13** in position against the pull of gravity and untoward accelerations. Tape **12** passes around a curved surface on the right-hand portion of each of the apertures **22** and **23**, and when the tape is under tension in excess of that exercised by gravity, etc., it exerts a clockwise rotational force on the brake arm **26** to release the engagement between brake pad **32** and the ball **20**.

Thus, as the microphone **11** and tape **12** are pulled out of the housing **10**, the clockwise movement of the brake arm **26** releases ball **20** and allows the boom **13** to swivel out of its FIG. **3** home position to an extended position such as that illustrated in FIG. **1**. Likewise during the removing operation, the force exerted by the tape against the walls of the aperture **22** in the boom **13** causes the boom to track the tape angular orientation with respect to the housing **10**. When the removing operation terminates, the tape **12** is otherwise locked with the extent of removal thus attained (as will be described) so that the only tension on the part of the tape extending through the apertures **22** and **23** is that due to the weight of the microphone **11** and the tape **12**. Spring **31** then drives brake arm **26** in a counter clockwise direction to hold the ball **20** and the boom **13** in the angular orientation position thus attained.

It will be apparent that different drivers are likely to require microphone **11** positions which are unique to their respective needs so that the boom **13** may not turn in a plane which is perpendicular to the face of the housing **10**. Departures from such perpendicularly will impose a limited amount of twist about the longitudinal axis of the tape **12**, but such twisting will be limited to the region of the tape held between the sides of the apertures **22** and **23**.

In order to avoid a need for sliding electrical contacts sometimes found in reel-type retraction mechanisms, the tape **12** passes through a first semicircular passage **33** in the slider block **27** and exits from the same face of that block to the clamp **28** already mentioned. It will be noted that the central portion of the apparatus in FIG. **3** is broken away, i.e., from a point near the lefthand side of recess **16** to a point first to the left of block **27** in its rightmost position, since the intervening part of the apparatus is merely connective and adds nothing to an understanding of the invention. However, tape **12** is also broken away just to the right of clamp **28** to indicate schematically that the clamp is actually located near the wall of recess **16** to allow maximum clearance for leftward movement of block **27**. Block **27** is slidably fitted between the walls of the housing **10** to move right or left as illustrated in the drawing without binding on those walls. A second semicircular passage **36** in the block **27** accommodates a constant force spring **37** which is normally largely wound upon a drum **38** which is rotatably mounted on an axle **39**. Spring **37** enters the passage **36** in the right-hand face of the block **27** and exits through the same face at the other end of the passage. A clamp **40** secures the otherwise free end of the spring **37** to the wall of the housing **10** as shown in FIG. **3**.

In order to remove the microphone **11** and tape **12** from the housing **10**, an appropriately directed force is applied by the user to position the microphone **11** at a convenient point in front of his mouth. This removal force on tape **12** draws the block **27** to the left against the force of the spring **37**. Upon removal of the tape removing force, spring **37** tends to rewind itself upon the drum **38** and thereby pull the block **27** to the right to return it to the position illustrated in FIG. **3** and thus retract the tape and the microphone into the housing. Of course, for mobile radiotelephone applications, the user wants the microphone and tape to remain in the removed position selected by the user during the telephone communication. Therefore, an automatic spring braking mechanism is provided. This mechanism is in the form of a rotatable brake member **41** which rotates on an axle **42** and is provided with a yoke portion **43**. The yoke portion holds a resilient brake pad **46** in order to bind the spring **37** between the pad and the adjacent wall of the housing **10** in the illustrated position of the yoke with the pad displaced slightly to the left of the rotational axis of the axle **42**. A torsion spring **47** extends around the axle **42** and includes end portions engaging the yoke **43** and a latching pawl **48**. That pawl is mounted for rotation on a further axle **49** which has its rotational axis in the same plane with the rotational axes of axles **39** and **42**. Thus, in the illustrated position of the brake member **41**, the spring **47** urges the brake member **41** in a clockwise direction and urges the pawl **48** in a counterclockwise direction.

When the block **27** moves to the left, during removal of the tape **12** from the housing, against the combined forces springs **37** and **47**, brake member **41** rotates slightly in the counterclockwise direction thereby releasing spring **37**. When the removing action ceases, spring **37** starts to rewind itself on the drum **38**; but, since pad **46** is still touching spring **37**, brake member **41** is thereby caused to rotate in a clockwise direction and once again grips spring **37** to prevent further retraction.

When a user wishes to retract the microphone **11** into the housing **10**, it is necessary simply to push the volume control knob **17** upward as illustrated in FIG. **3**. This action causes the end of the volume control shaft **14** to drive a flexible arm **50** against a shoulder **57** on the brake member **41** to rotate that member in the counterclockwise direction and thereby release the braking action. If knob **17** is completely depressed, member **41** turns far enough to allow a latching pawl **48** to engage member **41**, as will be described, and thereby hold the brake released. This permits spring **37** to rewind itself upon the drum **38** until the slider block **27** restores pawl **48** to its illustrated position where block **27** is blocked by the pawl **48** from further movement to the right. Release of member **41** allows the torsion spring **47** to reestablish the braking action on tape **37** and drive the volume control knob back to its normal position.

Brake member **41** is also provided with an inertial mass portion **52** located with respect to the axle **42** so that sudden deceleration of the vehicle in which the housing is mounted will cause counterclockwise rotation of the brake member **41** through a sufficient arc so that a face **53** of the inertial mass portion **52** passes a latching face **56** on the pawl **48**. Consequently, the pawl is free to rotate in a counterclockwise direction in response to the force supplied by the torsion spring **47** assuming that tape **12** is in a sufficiently extended position so that block **27** has been displaced toward the left a sufficient amount to allow the required pawl rotation. A passageway **55** between the left-hand and right-hand faces of pawl **48** had initially allowed air flow as block **27** moved to the left during tape extension to prevent vacuum drag on the block and a similar vent **58** in the right-hand wall of housing **10** cooperates to that end. However, the passageway **55** is closed by the mass portion **52** when it is latched by pawl **48**. The turning of the pawl **48** locks the brake member **41** in a rotated position as illustrated, for example, in FIG. **5** and automatically maintains the brake released until tape **12** has been retracted.

Spring **37** rewinds itself to accomplish that retraction and correspondingly slides block **27** to the right. Passageway **55** is closed by mass **52** while it is latched in the brake-released position so that pawl **48** blocks substantial air flow to provide pneumatic cushioning for block **27** just before it strikes pawl **48**. When the block strikes the rotated pawl **48**, that pawl is thereby restored to the normal position illustrated in FIG. **3** for reengaging the braking member **41** with the spring **37**.

In applications of the invention where clearances within housing **10** are sufficient to permit spring **37** to become unstable and to become kinked in the region between drum **38** and the block **27**, spring edge retaining grooves (not shown in the drawing) are secured to walls of housing **10** in appropriate regions to restrain the tendency toward instability. The width of portions of spring **37** in and adjacent to passage **36** are narrower than the rest of the spring to permit passage between such grooves.

FIG. **6** illustrates in transverse section one embodiment of the tape **12** in accordance with the present invention. In this embodiment, three flat strip conductors **59**, **60**, and **61** of an electrically conductive material such as copper are spaced in parallel relationship on a longitudinal edge-to-edge basis. Layers of insulation **54** enclose and electrically separate the conductors. An electromagnetic shielding layer **62** is applied around the insulated conductors **59–61**. One example of such a material is aluminized polyethylene terephthalate plastic. A folded lap joint is utilized in layer **62** between conductors **59** and **60** to facilitate continuous electrical contact in the aluminized layer which usually is on only one side of the layer. The shielded assembly is then enclosed in a further layer of polyethylene terephthalate plastic to provide an assembly which is impervious to air and water and which has a transversely curved cross-section as shown in FIG. **6** when the tape is in its unrestrained condition. This configuration of the tape, plus its corresponding positional restraint of the flat conductors **59–61**, allows the tape to bend upward, as illustrated in FIG. **6**, about a transverse axis, e.g., in the plane of the drawing. The same transverse curvature of the tape also prevents similar downward bending as well as preventing bending to the right or to the left unless accompanied by a corresponding twisting force acting about the longitudinal axis of the tape. A tape having a width W of approximately 0.25 inches advantageously has a cross-sectional height, i.e., chordal depth of curvature, of approximately W/6 for a tape of approximately 0.015 inches in thickness. Tapes of such dimensions readily support microphones such as those conventionally found in hearing aids and weighing approximately 1 gram when the tape is extended distances suitable for mobile radiotelephone use, e.g., about 18 inches. Microphones of that type are typically of about the same width as the tape and when housed in a thin case centralized to the thickness of the tape apply insufficient torque to twist the tape.

Tape **12** threads the various passageways in FIG. **3** so that the concave face of the tape is toward the inside of all curves that must be negotiated. The configuration illustrated in FIG. **6** does allow an apparent departure from the flexibility limitations mentioned if a twisting force is applied about the longitudinal axis of tape in excess of a predetermined threshold which depends upon the materials and the dimensions of the tape. However, as indicated in connection wth FIG. **3**, normal operation of the invention involves twisting effects only between the boom **13** and the brake arm **26** where the twisted tape portion is supported at both ends.

FIG. **7** illustrates in transverse section another embodiment of the invention which still utilizes the same overall transverse curved configuration. In this embodiment, two conductors **62** and **63** of circular cross-section are arranged near the longitudinal edges of the tape. A central transversely curved metallic strip conductor **66** of, for example, phosphor bronze provides a ground conductor for circuits utilizing the conductors **62** and **63**. The three conductors are advantageously encapsulated in polyethylene terephthalate plastic **64**. In this embodiment, the curved strip **66** enhances the previously described single degree of freedom of flexibility for the tape.

In applications of the invention wherein extra rigidity is useful in directions other than that of the single degree of freedom of flexibility, a messenger strip is advantageously provided. Such a strip is the transversely curved metallic strip **72** in FIG. **7**. This strip, which is advantageously spring steel, is of the same length as strip **12** and secured to it at each end but otherwise free to slip longitudinally or transversely with respect to strip **12**.

FIG. **8** illustrates a further embodiment including three flat strip conductors **67**, **68**, and **69** encapsulated in the aforementioned plastic material **65**, but in this embodiment the conductors lie in a flat co-planar edge-to-

edge arrangement. A ridge **70** extends along the length of the tape in the center of one side and has multiple cuts **71** through the height of the ridge at regular intervals as illustrated in FIG. **9**. These cuts allow the unidirectional degree of freedom of flexibility previously described. However, this arrangement requires enlarged passages in the tape tracking, holding, and retracting mechanisms.

FIG. **10** is a top view of the embodiment of FIG. **1** with the microphone and boom extended and viewing the tape in longitudinal edge profile. In the event of a movement by the vehicle driver to his left or forward (up or to the right as illustrated in FIG. **10**) the microphone **11** which has been in position in front of the driver's mouth is easily deflected to, e.g., the dotted line position illustrated in FIG. **10**, because that is the single direction of free flexibility of the tape in configurations such as those illustrated in FIGS. **6** through **9**.

FIG. **11** shows a cross-sectional view, as in FIG. **3**, of a different embodiment of the tape tracking and holding mechanism. For this case, the slider block **27** and retracting mechanisms are the same as in the right-hand portion of FIG. **3**. A cylindrical swivel **92**, shown in perspective in FIG. **16**, is supported for rotation in housing **10** by bearings **95**. A cantilever spring **96** at the right-hand end is positioned between two lugs **97** (only one of which is specifically shown) to define a central position for swivel **92** from which the swivel can be rotated about 45 degrees in either direction. Spring **96** returns to swivel to its central position when the swivel is released.

A central aperture **103**, seen best in FIG. **16**, extends transversely through the swivel **92** to accommodate a stub boom **80**, a brake link **86**, and a pivotable link **83**. The boom **80**, which is shown in perspective in FIG. **17**, includes the aperture **22'** for passage of tape **12** and is mounted for rotation on an axle **81** which is supported in receiving openings **81'** (one shown in FIG. **16**) in swivel **92**. As shown in FIG. **11**, boom **80** is in its home position in swivel **92** and is essentially flush with the surface of that swivel except for a knurled portion **93** to the left and below axle **81**. A user need only apply thumb pressure to the portion **93** to turn the right-hand portion of boom **80**, along with microphone **11**, out of swivel **92** to facilitate the grasping of the microphone for extension. Boom **80** can thereafter be turned up to about 135 degrees clockwise from its home position.

The holding mechanism includes the brake link **86**, also rotatably mounted on the axle **81**, and pivotable link **83** rotatably mounted, on an axle **87**, in the aperture **103**. Axle **87** is supported in receiving openings **87'** (one shown in FIG. **16**) in swivel **92**. Links **86** and **83** are further illustrated in perspective in FIGS. **14** and **15**, respectively. As is best seen in the cross-sectional view of FIG. **12**, link **86** is positioned between the two branches of the bifurcated left end of boom **80**. A pin **84** interconnects the right-hand end of link **86** and the left-hand end of link **83** so that as tape **12** is drawn out of housing **10** link **83** is turned clockwise about axle **87** and in turn drives link **86**, through pin **84**, in a counterclockwise direction against the action of a biasing coil spring **89**. This turning moves a resilient friction member **88**, with an internal reinforcement axle **90**, out of engagement with the wall of housing **10** so that cylindrical swivel **92** is thereby freed to turn as required to track the position of tape **12**. Member **88** floats in a saddle groove **104** in link **86** and is free of boom **80** in its home position. Member **88** is driven against the wall of housing **10** by turning a link **86** in a clockwise direction. Two radial braking surfaces **105** and **106** are provided inside each of the bifurcation branches of boom **80** to be engaged by member **88** when tape tension is released. Sector **106** has a smaller radius about axle **81** than does sector **105** so that initial rotation of boom **80** from the home position will not inadvertently actuate the braking function of member **88** even if the tension on tape **12** should be momentarily released. Since the braking mechanism, including link **86** and member **88**, acts on boom **80**, and both link **86** and boom **80** are mounted on swivel **92**, that swivel is also held when the braking mechanism is engaged to hold boom **80**. Housing **10** is dimpled adjacent to swivel **92**, as shown in FIG. **12**, to provide a substantially uniform braking surface in all positions of swivel **92**.

When a microphone and tape extension has ended with the microphone in a user-selected position, the relaxation of tension in tape **12**, as already described, releases link **83**. Bias spring **89** then drives link **86** clockwise to restore braking action of member **88**. Excessively forceful wedging of member **88** between housing **10** and one of the camming sectors **105** or **106** of boom **80** is prevented by a mechanical stop surface **99** on link **86** bearing against link **83**.

At the right-hand end of swivel **92** in FIG. **11**, the tape **12** extends through a passage **98** toward block **27**. That passage and the nearby spring **96** are also seen in FIG. **13**. Between the passage **98** and block **27** the tape **12** can be subjected to limited twisting to accommodate rotation of swivel **92**.

Although the present invention has been described in connection with particular applications and embodiments thereof, it is to be understood that additional applications, embodiments, and modifications which will be obvious to those skilled in the art are included within the spirit and scope of the invention.

I claim:

1.

A microphone support comprising an elongated member (**12**) having a microphone (**11**) mounted on one end thereof, said member being flexible in a first direction perpendicular to the longitudinal axis of said member and essentially rigid in the opposite colinear direction and in both directions perpendicular to the first direction in a plane perpendicular to said axis, the improvement in said support comprising

said member being formed from an unarticulated strip of material configured to produce the aforementioned flexibility characteristic,

means for removably housing (**10**) said member with said one end being positioned for first removal,

means for guiding (**13**) said member during removal from a home position in said housing, and

means, responsive to at least partial removal of said member from said housing, for resiliently urging (**37**) said member back into its home position in said housing.

2. The support in accordance with claim **1** in which means are provided for securing (**28**) an end of said elongated member to an interior portion of said housing, and

said resilient urging means comprises

constant force spring means (**37**), and

means for slidably coupling (**27**) an intermediate variable portion of said elongated member to

said spring means for urging said member into said housing under action of said spring means.

3. The support in accordance with claim **1** in which there are provided

means, including said guiding means, for tracking (**13**, **20**) angular orientation of said member with respect to said housing on removal, and means for holding (**26**) said tracking means when member removing stops,

means for releasably locking (**46**) said urging means to hold said member at a selectable extent of removal, and

means, responsive to release of said locking means, for releasing (**12** acting on **24**) said tracking means holding means.

4. The support in accordance with claim **3** in which said tracking means comprises

a boom (**13**) having an aperture (**22**) therein through which said member passes during removal from and return to said housing, and

means for swivelably coupling (**20**, **21**) said boom to said housing and including a ball joint at one end of said boom.

5. The support in accordance with claim **3** in which said tracking means comprises

a boom (**80**) having an aperture (**22'**) therein through which said member passes during removal from and return to said housing,

a cylindrical swivel (**92**) mounted for rotation about its longitudinal axis in said housing, and

means for mounting (**81**) said boom on said swivel for rotation about an axis perpendicular to a plane including said swivel axis.

6. The support in accordance with claim **3** in which there are provided

manually actuatable means for releasing (**50**, **57**) said locking means.

7. The support in accordance with claim **3** in which there are provided

means, responsive to at least a predetermined rate of deceleration of said housing following movement thereof in a predetermined direction, for releasing (**52**) said locking means.

8. The support in accordance with claim **7** in which there are provided

means, responsive to release of said locking means by said deceleration responsive releasing means while said member is at least partially removed from said housing, for latching (**48**) said locking means in a lock-released position.

9. The support in accordance with claim **8** in which there are provided

means for releasing (**27** striking **48**) said latching means upon restoring said member to its home position within said housing.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 4,215,250

DATED : July 29, 1980

INVENTOR(S) : Baird E. Resener

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, lines 20 and 21, "advantageously at connectable 29 the loose ends of these conductors" should read --advantageously connectable at the loose ends 29 of those conductors--.

Column 3, line 67, "perpendicularly" should read --perpendicularity--.

Column 4, line 10, "lefthand" should read --left-hand--.

Column 4, line 11, "first" should be --just--.

Column 5, line 4, "14" should be --44--.

Column 8, lines 40 and 41, "1. A microphone" should read --1. A microphone--

Signed and Sealed this

Sixteenth Day of December 1980

[SEAL]

Attest:

SIDNEY A. DIAMOND

Attesting Officer

Commissioner of Patents and Trademarks